JACC: CASE REPORTS VOL. 18, 2023

EDITORIAL COMMENT

Transcatheter Edge-to-Edge Repair

A Promising or Last Resort Technique for Carpentier Class IIIa Mitral Regurgitation?*

Fadi J. Sawaya, MD,[a] Jamil Francis, MD[b]

Mitral regurgitation (MR) is a common valvular heart disease and is associated with high mortality and morbidity.[1] Surgical mitral valve repair or replacement has been the standard treatment for severe MR. However, some patients may not be suitable for surgery owing to comorbidities, frailty, or other reasons. Transcatheter edge-to-edge repair (TEER) is a minimally invasive technique for MR, which has been shown to be effective and safe in selected patients.[2] The effectiveness of TEER devices depends on the underlying pathologic features and anatomy of the mitral valve, and the first clinical trials were intentionally restricted to simple, central mitral lesions.[3] The latest data presented have shown that TEER therapy can be used to treat more complex mitral lesions with good results in reducing MR and providing clinical benefits. This supported the expansion of the use of the MitraClip.[4] Despite the advancements in 3-dimensional transesophageal echocardiography, which have broadened the scope of anatomical suitability for TEER, there are still certain factors and restrictions that must be considered when using this method.

Namely, there is a high likelihood of clinically significant mitral stenosis after TEER in patients with a Carpentier IIIa cause of MR, which is often associated with chronic rheumatic disease. In this disease subset, even if the mitral valvular orifice appears to be of adequate size for TEER therapy, there is frequently subvalvular disease and thick, stiffened leaflets such that TEER therapies would result in unacceptable mitral stenosis.[5]

In this issue of *JACC: Case Reports*, Liu et al[6] present a case of severe Carpentier IIIa MR that was predilated with a commissurotomy balloon (BMC) before undergoing TEER. The open surgical approach was declined by both the patient and the surgeon because the patient had advanced liver disease. The patient was followed up for 7 months and experienced favorable clinical outcomes.

A baseline mean mitral inflow gradient >5 mm Hg is considered to indicate a high risk of severe MS (mitral stenosis) after TEER[5] which is associated with worse outcomes and higher mortality.[7] Although the patient in the case report had a baseline mean pressure gradient of 3.6 mm Hg, which was reduced to 2.4 mm Hg after BMC, the mean valve gradient (MVG) went up to 8 mm Hg after the TEER.

Furthermore, according to Lim et al,[5] a small valve area (<3.5 cm^2) before TEER is considered to show a high risk for the development of severe MS after TEER, and <4 cm^2 according to Praz et al.[7] The patient in this case had a borderline value of 3.6 cm^2 (planimetry) before TEER but was not measured after BMC, and the value decreased to 1.7 cm^2 after TEER.

It would have been beneficial to measure the mitral valve area (MVA) after BMC (it was presented only at baseline and after TEER); second, it would help to measure the MVA after TEER using the same echocardiographic technique, because it was calculated using 2 different techniques (Doppler pressure half time vs planimetry), which might suggest a source of bias.

The benefit of this technique was evident regarding symptoms, not only perioperatively but

*Editorials published in *JACC: Case Reports* do not necessarily represent the views of *JACC: Case Reports* or of the American College of Cardiology.

From the [a]Division of Interventional and Structural Cardiology, American University of Beirut Medical Center, Beirut, Lebanon; and the [b]Division of Cardiology, American University of Beirut Medical Center, Beirut, Lebanon.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

ISSN 2666-0849 https://doi.org/10.1016/j.jaccas.2023.101907

also with the 7 months of follow-up done by the team. A longer follow-up time on the evolution of the MVG would be beneficial, because 7 months is still considered a short follow-up period.

Overall, this patient is considered to be at high risk for severe MS after TEER, considering the cause of his MR. Adding the middle step of BMC was a reasonable approach before applying the TEER to make it feasible in this challenging case. Technical considerations should be kept in mind: 1) patients should have isolated MR with a large anatomy; 2) P2/A2 scallop is the key to success; 3) the thickness and pliability of the leaflets limit the success; and 4) the probability of clip-induced MS is high.

Careful selection of cases is warranted because, as we have seen in this patient, the MVG was not significantly elevated before TEER; although a neoadjuvant BMC was done, it had still reached 8 mm Hg after TEER, which is considerable. Moreover, BMC could potentially worsen the MR when asymmetric fusion and calcium occur at the site of the lateral commissure. This case demonstrates that TEER could still benefit a wider range of inoperable patients, improving their cardiac index, symptoms, and physiology, without inducing clinically significant MS, but should be used with caution.

The possibility of rheumatic MR being treated with the percutaneous edge-to-edge mitral valve repair system in appropriately selected patients can be considered. Significant MS has to be excluded, and the heart team should carefully consider whether the benefits of MR reduction are thought to significantly outweigh the risk of MS.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr Fadi Sawaya, Division of Cardiology, Interventional and Structural Cardiology, American University of Beirut Medical Center, Beirut, Lebanon. E-mail: fjsawaya@gmail.com.

REFERENCES

1. Nkomo VT, Gardin JM, Skelton TN, Gottdiener JS, Scott CG, Enriquez-Sarano M. Burden of valvular heart diseases: a population-based study. *Lancet*. 2006;368(9540):1005-1011.

2. Feldman T, Kar S, Elmariah S, et al. Randomized comparison of percutaneous repair and surgery for mitral regurgitation: 5-year results of EVEREST II. *J Am Coll Cardiol*. 2015;66(25):2844-2854.

3. Feldman T, Foster E, Glower DD, et al. Percutaneous repair or surgery for mitral regurgitation. *N Engl J Med*. 2011;364:1395-1406.

4. Lim DS, Herrmann HD, Grayburn P, et al. Consensus document on non-suitability for transcatheter mitral valve repair by edge-to-edge therapy. *Structural Heart*. 2021;5(3):227-233. https://doi.org/10.1080/24748706.2021.1902595

5. Lim DS, Hermann HC, Grayburn P, et al. Consensus document on non-suitability for transcatheter mitral valve repair by edge-to-edge therapy. *Structural Heart*. 2021;5(3):227-33.

6. Liu H-F, Lai H-C, Liu C-N, et al. Transcatheter edge-to-edge repair for a patient with severe mitral regurgitation of Carpentier IIIa classification. *J Am Coll Cardiol Case Rep*. 2023;18:101911.

7. Praz F, Braun D, Unterhuber M, et al. Edge-to-edge mitral valve repair with extended clip arms: early experience from a multicenter observational study. *J Am Coll Cardiol Intv*. 2019;12(14):1356-1365.

KEY WORDS Carpentier IIIa, MitraClip, severe mitral regurgitation, TEER, transcatheter edge-to-edge repair